QuickTime Streaming Server Programming

Session 727

QuickTime Streaming Server Programming

John Murata
Core Server Engineer
murata@apple.com

Introduction

- QuickTime Streaming Server (QTSS) is the open source Darwin Streaming Server (DSS) and more
- Add your code to create your own streaming server, user interface, playlist broadcaster, or network client
- Modify and use the DSS source to create your own product

What You'll Learn

- Source features
- Server architecture
- Other types of products included in the source
- How to build and install products
- Debugging tips and how to privatize your products

Source Features

Apple Open Source development

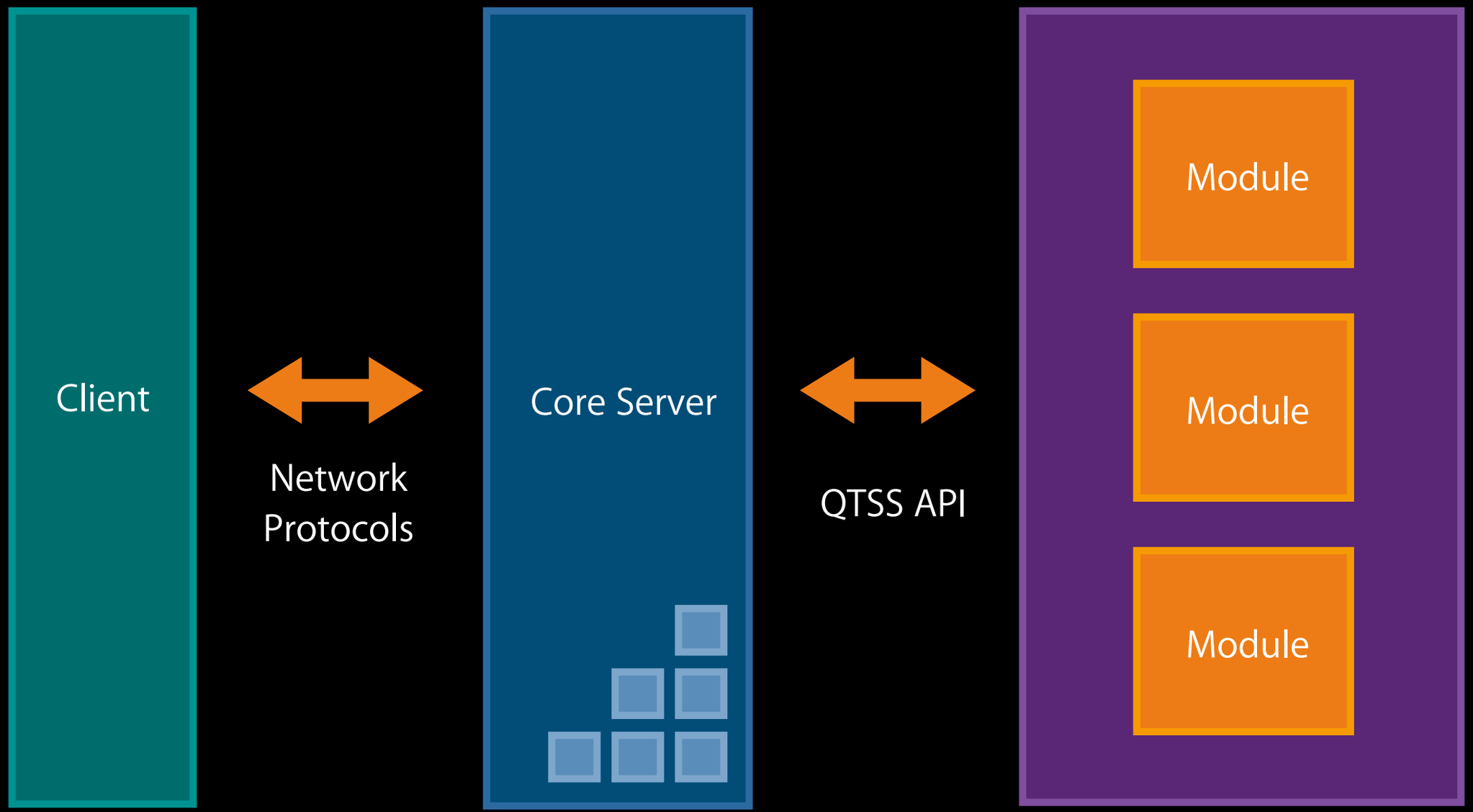
- Read and follow the Apple Public Source License
- http://www.opensource.apple.com/apsl/
- Plan your changes and additions
- Create your software
- Post your changes to
  - http://www.lists.apple.com/mailman/listinfo/publicsource-modifications

Source Features

- Server and server modules
- Multiple OS porting support files
- Protocol support classes and files
- Client development library
- RTSP-RTP Proxy server
- MP3 and hinted-MPEG4 file broadcasting
- QuickTime, MP3, MPEG4, 3GPP file reading library and tools
- Web-based server UI

Source Features

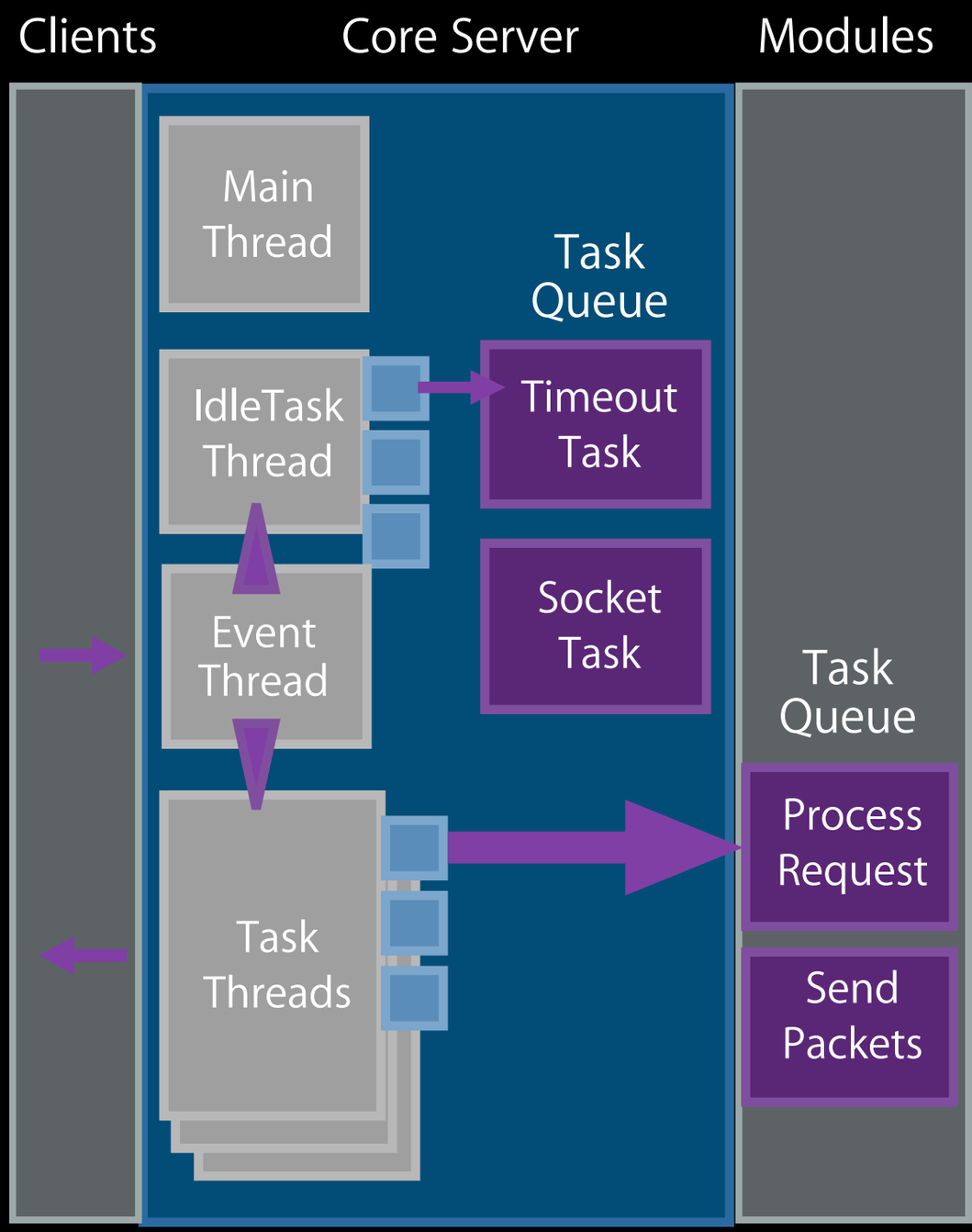
Server and server modules



Core Server

Execution

- Main status thread
- IdleTask thread
- Event thread
- One or more Task threads



Concurrency

- One parent process
- One child process
- One task thread per processor
- Modules may require private threads

Demo

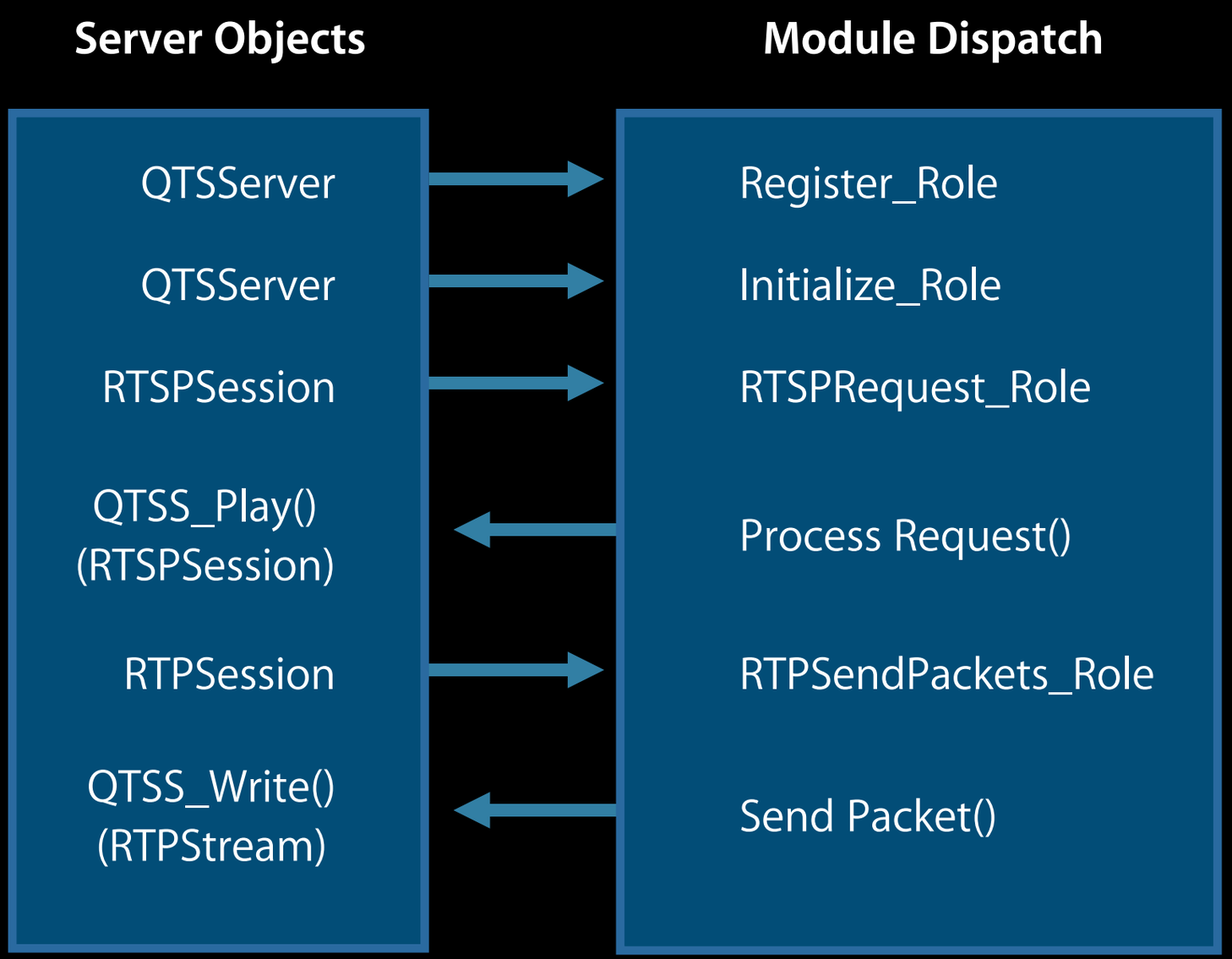
Core Server

Main components

- QTSServer
- QTSSCallbacks
- QTSSDictionary
- RTSPSession
- RTSP support
- RTPSession
- RTP support
- QTSServerPrefs

Modules

Module execution



Modules

Built-in

- Content
- Server support
- Access control

Modules

Content

- QTSSFileModule
- QTSSReflectorModule
- QTSSRelayModule
- QTSSMP3StreamingModule

Modules

Server support

- QTSSErrorLogModule
- QTSSAccessLogModule
- QTSSWebStatsModule
- QTSSWebDebugModule
- QTSSAdminModule
- QTSSPOSIXFileSysModule

Modules

Access control

- QTSSAccessModule
- QTSSHomeDirectoryModule
- QTSSHttpFileModule
- QTSSSpamDefenseModule

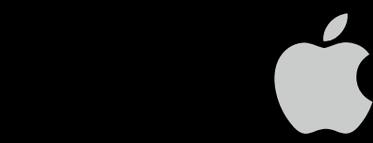
Demo

Protocols

- Server support
  - RTSP over TCP
  - RTP over UDP
  - RTP over Apple Reliable UDP (skip protection)
  - RTSP/RTP in HTTP (tunneled)
  - RTP over RTSP (RTP over TCP)

Protocols

- Module implementations
  - HTTP
    - QTSSAdminModule
    - QTSSMP3StreamingModule
    - QTSSWebStatsModule
    - QTSSHTTPStreamingModule
    - QTSSRefMovieModule
    - QTSSWebStats
    - QTSSWebDebugModule

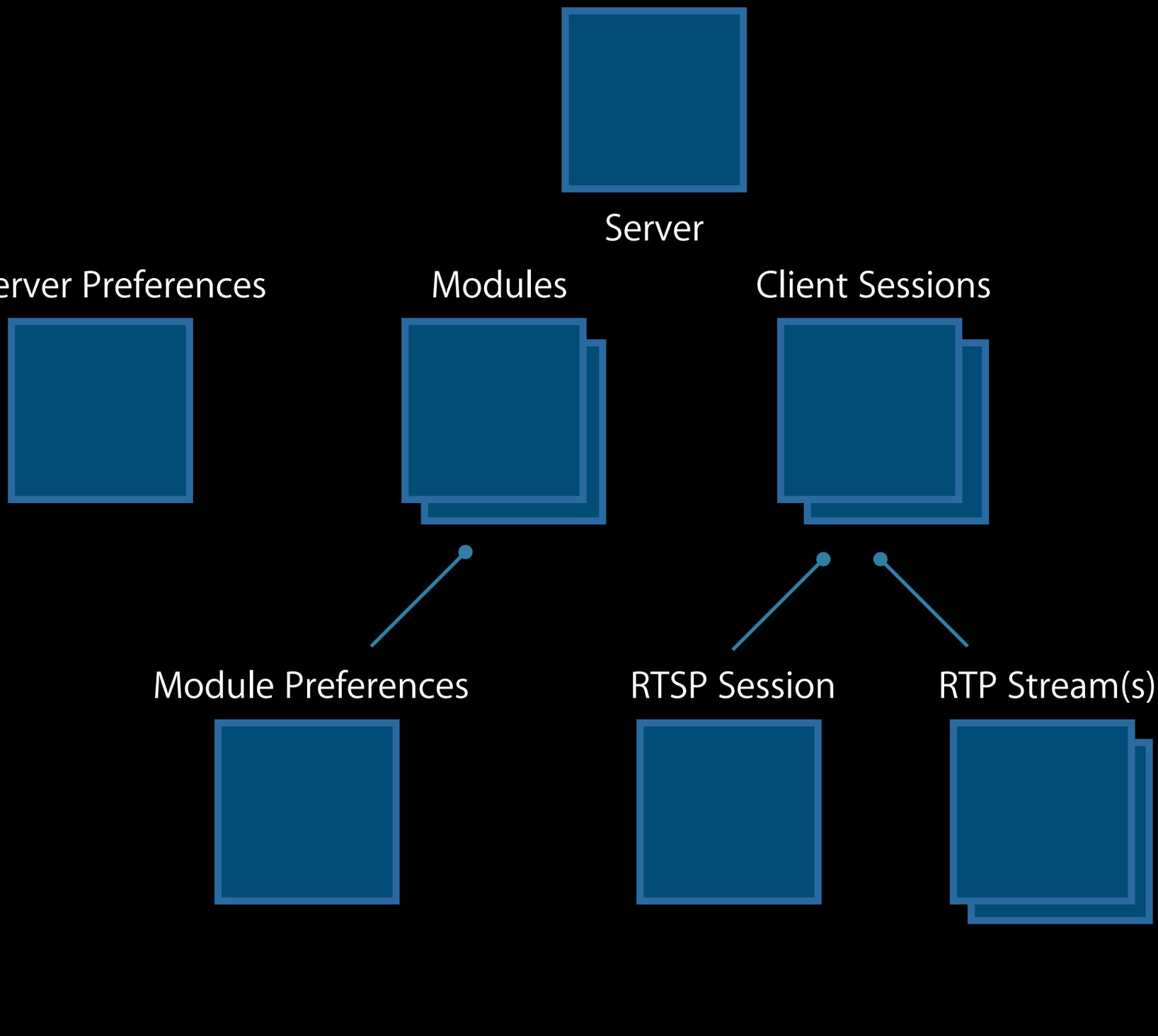


Data

- Dictionaries are API objects
- Interface classes
  - QTSServerInterface
  - RTSPSessonInterface
  - RTPSessionInterface
  - RTSPRequestInterface

Server Object Data Model

Server object hierarchy



Demo

Server Source Directories

- Server.tproj
- CommonUtilitiesLib
- QTFileLib
- APICommonCode
- APIModules
- RTSPClientLib
- RTCPUtilitiesLib
- HTTPUtilitiesLib

Application and Tools

- PlayListBroadcaster
- MP3Broadcaster
- StreamingProxy
  - Posix and OSX only
- QTFileTools
  - Posix and OSX only
  - Not maintained
- WebAdmin
- qtpasswd

Trademarks and Other Constants

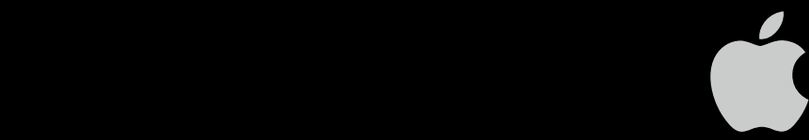
- Revision.h—version and build constants
- QuickTime or Darwin Streaming Server name
  - PlatformHeader.h
  - defaultPaths.h
  - StreamingServer.pbproj
  - WebAdmin/src/streamingadminserver.pl
  - CommonUtilitiesLib/win32ev.cpp
- Installer scripts

Building the Software

- Posix: Buildit script
  - Binaries left in source directories
- OSX: Buildit script
  - StreamingServer.pbroj—target DSS
  - Binaries in build directory
- Windows: WinNTSupport/StreamingServer.dsw
  - Batch build all
  - Binaries in Debug and Release directory

Creating the Installer

- Posix
  - Buildtarball script
    - Creates an install directory with Install script and tar file
- OSX
  - BuildOSXInstallerPkg dss
    - Creates a DarwinStreamingServer.pkg
- Windows
  - WindowsNTSupport/makezip.bat
    - Creates an install directory with Install.bat file



Troubleshooting Modes

- Turn on the debugging options in streamingserver.xml

```
<PREF NAME="RTSP_debug_printfs" TYPE="Bool16">true</PREF>
<PREF NAME="enable_packet_header_printfs" TYPE="Bool16" >true</PREF>
<PREF NAME="packet_header_printf_options" >rtp;rr;sr;app;ack;</PREF>
```

- Launch from the terminal in “debug” mode

```
root% QuickTimeStreamingServer -d
```

- Connect a client

Demo

Debug printfs

- CommonUtilitiesLib/Task.h

```
#define TASK_DEBUG 1

Example
Task::Signal enque task TaskName=RTSPSession ...
TaskThread::Entry run task TaskName=RTSPSession...
TaskThread::Entry insert task TaskName=RTPSession...
TaskThread::Entry run task TaskName=RTPSession...
TaskThread::WaitForTask found timer task TaskName=QTSSAccessLog
TaskThread::Entry run task TaskName=QTSSAccessLog...
```

Debug printfs

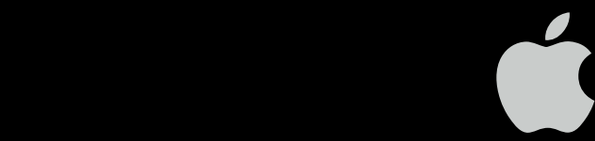
- CommonUtilitiesLib/OSFileSource.cpp

```
#define FILE_SOURCE_DEBUG 1

Example
OSFileSource::SetLog=/Library/QuickTimeStreaming/Movies/
sample_100kbit.mov
FileMap::AllocateBufferMap shared buffers
OSFileSource::ReadFromCache inPosition =272...
OSFileSource::ReadFromCache inPosition =276...
OSFileSource::ReadFromCache inPosition =280...
.....
OSFileSource::ReadFromCache inPosition =80667
```

Resources

- RFCs
  - RTSP 2326
  - RTP 1889
  - SDP 2327
  - HTTP 1.1 (2616)
- Streaming open source projects (SourceForge.net)
  - mpeg4ip
  - LiveMedia



Wrap Up

Roadmap

701 QuickTime State of the Union	The Presidio Tue., 9:00am
708 QuickTime APIs Update	Pacific Heights Tue., 5:00pm
711 Audio and QuickTime	Russian Hill Wed., 9:00am
716 Advanced QuickTime Programming Techniques	Pacific Heights Wed., 2:00pm
Moved to Marina FF011 QuickTime Feedback Forum	The Marina Thur., 3:30pm
730 QuickTime Alternative Programming Environments	Pacific Heights Fri., 10:30pm

Who to Contact

Guillermo Ortiz
QuickTime Technology Manager
quicktimeman@apple.com

http://developer.apple.com/wwdc2003/urls.html

For More Information

Documentation

General Information

http://www.apple.com/quicktime

Developer Information

http://developer.apple.com/documentation

QuickTime Information

http://developer.apple.com/QuickTime

Reference Library

Developer Documentation

QuickTime Streaming Server Modules
http://developer.apple.com/darwin/projects/streaming/QTSS.pdf

streaming-server-developers Mailing List
http://lists.apple.com/streaming-server-developers

Server Source—Documentation Directory
AboutTheSource.html

DevNotes.html

SourceCodeFAQ.htmlGuide

Do Not Miss!

Lab: QuickTime Content Creation

Meet with QuickTime content experts for daily content specific topics that are of special interest to you. Bring your own media and PowerBook. No appointment is needed—first-come, first-served.

Sacramento Room

Lab: QuickTime Development

Meet with Apple's QuickTime engineers. Each day will emphasize a specific QuickTime development topic. Bring your own code and PowerBook. No appointment is needed—first-come, first-served.

Sacramento Room

Lab Hours

Monday	12:00pm to 6:00pm
Tuesday	9:00am to 6:00pm
Wednesday	9:00am to 6:00pm
Thursday	9:00am to 4:30pm
Friday	9:00am to 6:00pm

Q&A

Guillermo Ortiz
QuickTime Technology Manager
quicktimeman@apple.com

http://developer.apple.com/wwdc2003/urls.html

WWDC 2003

Worldwide Developers Conference